

Amendments to the Claims:

The following listing of claims will replace all prior versions, and listings, of claims in the application:

1. (Currently Amended) A semiconductor ~~device characterized in device~~, comprising:
a semiconductor chip having a main surface and a sidewall;
a wiring layer formed on ~~a~~the main surface of ~~a~~the semiconductor chip; and
a conductive layer for interlayer connections that is connected to the wiring layer and formed in ~~a~~the side wall of the semiconductor chip.
2. (Currently Amended) A semiconductor ~~device characterized in device~~, comprising:
a semiconductor chip having a main surface;
electrode pads formed on ~~a~~the main surface of ~~a~~the semiconductor chip;
grooves formed in a section of the semiconductor chip that traverses in a thickness direction of the semiconductor chip;
conductive layers filled in the grooves; and
wiring layers that connect the electrode pads and the conductive layers.
3. (Currently Amended) A semiconductor ~~module characterized in module~~, comprising:
semiconductor chips stacked in layers;
conductive layers ~~that are~~ formed in side walls of the respective semiconductor chips ~~for providing to provide~~ interlayer connections among the semiconductor chips; and
wiring layers ~~that are~~ formed on main surfaces of the respective semiconductor chips and connected to the conductive layers.

4. (Currently Amended) A semiconductor ~~module characterized in module~~, comprising:

semiconductor chips stacked in layers;

electrode pads formed on main surfaces of the respective semiconductor chips;

grooves ~~that are~~ formed in sections of the respective semiconductor chips that traverse in a thickness direction of the semiconductor chips;

conductive layers filled in the grooves ~~for providing to provide~~ interlayer connections among the semiconductor chips; and

wiring layers that connect the electrode pads and the conductive layers, respectively.

5. (Currently Amended) A semiconductor ~~module characterized in module~~, comprising:

semiconductor chips stacked in layers;

electrode pads formed on main surfaces of the respective semiconductor chips;

grooves ~~that are~~ formed in sections of the respective semiconductor chips that traverse in a thickness direction of the semiconductor chips;

wiring layers that connect the electrode pads and the conductive layers;

pin-like terminals ~~that are~~ embedded in the grooves and disposed in a stacking direction of the semiconductor chips;

an interposer substrate with the pin-like terminals standing thereon; and

conductive layers filled in the grooves with the pin-like terminals therein.

6. (Currently Amended) ~~A~~The semiconductor module according to claim 3, the semiconductor chips ~~are being~~ stacked in layers through dielectric resin.

7. (Currently Amended) A semiconductor ~~module characterized in module~~, comprising:

an interposer substrate having a wiring layer formed on a main surface thereof; a semiconductor chip ~~that is connected to the wiring layer and mounted on the interposer substrate;~~

grooves formed in a side wall of the interposer substrate that traverses in a thickness direction of the interposer substrate; and conductive layers filled in the grooves.

8. (Currently Amended) A semiconductor ~~module characterized in module~~, comprising:

interposer substrates stacked in layers; wiring layers formed on main surfaces of the interposer substrates; semiconductor chips ~~that are connected to the wiring layers and mounted on the interposer substrates;~~

grooves formed in side walls of the interposer substrates that traverse in a thickness direction of the interposer substrates;

conductive layers filled in the grooves ~~for providing to provide~~ interlayer connections among the interposer substrates; and

recessed sections formed in back surfaces of the interposer substrates ~~for storing to store~~ the semiconductor chips.

9. (Currently Amended) A semiconductor ~~module characterized in module~~, comprising:

an intermediate substrate having an opening section formed therein; interposer substrates stacked in layers through the intermediate substrate; wiring layers formed on main surfaces of the interposer substrates;

semiconductor chips ~~that are~~ connected to the wiring layers and mounted on the interposer substrates;

first grooves formed in side walls of the interposer substrates that traverse in a thickness direction of the interposer substrates;

second grooves formed in a side wall of the intermediate substrate that traverses in a thickness direction of the intermediate substrate; and

conductive layers filled in the first grooves and the second grooves ~~for~~ providing to provide interlayer connections among the interposer substrates through the intermediate substrate.

10. (Currently Amended) An electronic ~~device characterized in device~~, comprising:

semiconductor chips stacked in layers;
electrode pads formed on main surfaces of the respective semiconductor chips;
grooves ~~that are~~ formed in sections of the respective semiconductor chips that traverse in a thickness direction of the semiconductor chips;

conductive layers filled in the grooves ~~for providing to provide~~ interlayer connections among the semiconductor chips;

wiring layers that connect the electrode pads and the conductive layers, respectively; and

an electronic component ~~that is~~ connected to the semiconductor chips through the conductive layers.

11. (Currently Amended) An electronic ~~device characterized in device~~, comprising:

semiconductor chips stacked in layers;
electrode pads formed on main surfaces of the respective semiconductor chips;

grooves that are formed in sections of the respective semiconductor chips that traverse in a thickness direction of the semiconductor chips;

wiring layers that connect the electrode pads and the conductive layers, respectively;

pin-like terminals that are inserted in the grooves and disposed in a stacking direction of the semiconductor chips;

an interposer substrate with the pin-like terminals standing thereon; conductive layers filled in the grooves with the pin-like terminals therein; and an electronic component that is connected to the semiconductor chips through the conductive layers.

12. (Currently Amended) An electronic device characterized in device, comprising:

interposer substrates stacked in layers; wiring layers formed on main surfaces of the interposer substrates; semiconductor chips that are connected to the wiring layers and mounted on the interposer substrates;

grooves formed in side walls of the interposer substrates that traverse in a thickness direction of the interposer substrates;

conductive layers filled in the grooves for providing to provide interlayer connections among the interposer substrates;

recessed sections formed in back surfaces of the interposer substrates for storing to store the semiconductor chips; and

an electronic component that is connected to the semiconductor chips through the conductive layers.

13. (Currently Amended) An electronic device characterized in device, comprising:

an intermediate substrate having an opening section formed therein;

interposer substrates stacked in layers through the intermediate substrate;

wiring layers formed on main surfaces of the interposer substrates;

semiconductor chips that are connected to the wiring layers and mounted on the interposer substrates;

first grooves formed in side walls of the interposer substrates that traverse in a thickness direction of the interposer substrates;

second grooves formed in a side wall of the intermediate substrate that traverses in a thickness direction of the intermediate substrate;

conductive layers filled in the first grooves and the second grooves for providing to provide interlayer connections among the interposer substrates through the intermediate substrate; and

an electronic component that is connected to the semiconductor chips through the conductive layers.

14. (Currently Amended) A method for manufacturing a semiconductor device, characterized in comprising:

a step of forming through holes on cutting lines of a semiconductor wafer;

a step of cutting the semiconductor wafer along the cutting lines into chips;

and

a step of filling conductive layers in the through holes divided by the cutting step cutting.

15. (Currently Amended) A method ~~for~~of manufacturing a semiconductor device, characterized in comprising:

a step of forming trench sections on cutting lines of a semiconductor wafer having wiring layers formed thereon;

a step of forming dielectric films within the trench sections;

a step of forming an under barrier metal layer that covers the dielectric films and is connected to the wiring layers;

a step of thinning a back surface of the semiconductor wafer to thereby make the trench sections penetrate to form through holes along the cutting lines;

a step of cutting the semiconductor wafer along the cutting lines into chips;

and

a step of filling conductive layers in the through holes that are divided by the cutting step.

16. (Currently Amended) A method ~~for~~of manufacturing a semiconductor module, characterized in comprising:

a step of forming conductive layers on side walls of a semiconductor chip; and

a step of providing interlayer connections through the conductive layers formed on the side walls of the semiconductor chip.

17. (Currently Amended) A method ~~for~~of manufacturing a semiconductor module, characterized in comprising:

a step of forming through holes on cutting lines of a semiconductor wafer;

a step of cutting the semiconductor wafer along the cutting lines into chips;

a step of stacking the semiconductor chips formed by the cutting step; cutting;

and

~~a step of~~ filling conductive layers in the through holes cut by the ~~cutting step~~cutting.

18. (Currently Amended) A method ~~for of~~ manufacturing a semiconductor module, ~~characterized in~~ comprising:

~~a step of~~ forming through electrodes on cutting lines of a semiconductor wafer;

~~a step of~~ cutting the semiconductor wafer along the cutting lines into chips;

and

~~a step of~~ providing interlayer connections among the semiconductor chips formed by the cutting ~~step via~~ the through electrodes that are cut by the ~~cutting step~~cutting.

19. (Currently Amended) A method ~~for of~~ manufacturing a semiconductor module, ~~characterized in~~ comprising:

~~a step of~~ forming trench sections on cutting lines of a semiconductor wafer having wiring layers formed thereon;

~~a step of~~ forming dielectric films within the trench sections;

~~a step of~~ forming an under barrier metal layer that covers the dielectric films and is connected to the wiring layers;

~~a step of~~ thinning a back surface of the semiconductor wafer to thereby make the trench sections penetrate to form through holes along the cutting lines;

~~a step of~~ cutting the semiconductor wafer along the cutting lines into chips;

~~a step of~~ stacking the semiconductor chips formed by the ~~cutting step~~cutting;

and

~~a step of~~ filling conductive layers in the through holes that are divided by the cutting ~~step~~.

20. (Currently Amended) A method ~~for~~of manufacturing a semiconductor module, ~~characterized in~~ comprising:

a step of forming through holes on cutting lines of a semiconductor wafer;

a step of cutting the semiconductor wafer along the cutting lines into chips;

a step of stacking the semiconductor chips on a interposer substrate having pin-like terminals standing thereon in a manner that the pin-like terminals are inserted in the through holes divided by the cutting step; ~~cutting~~; and

a step of filling conductive layers in the through holes that are cut.

21. (Currently Amended) A method ~~for~~of manufacturing a semiconductor module, ~~characterized in~~ comprising:

a step of mounting semiconductor chips on interposer substrates having grooves formed in side walls thereof and recessed sections formed in back surfaces thereof;

a step of stacking the interposer substrates having the semiconductor chips mounted thereon in ~~layers~~layers, such that each of the semiconductor chips is stored in each of the recessed sections of an upper layer of the stacked interposer substrates; and

a step of filling conductive layers in the grooves of the interposer substrates to provide interlayer connections.

22. (Currently Amended) A method ~~for~~of manufacturing a semiconductor module, ~~characterized in~~ comprising:

a step of mounting semiconductor chips on interposer substrates having grooves formed in side surfaces thereof;

a step of stacking the interposer substrates having the semiconductor chips mounted thereon through intermediate substrates having opening sections formed in main surfaces thereof and grooves formed in side walls thereof; and

a step of filling conductive layers in the grooves of the interposer substrates and the intermediate substrates to provide interlayer connections.

Amendments to the Drawings:

The attached replacement drawing sheets make changes to Figs. 14(a)-14(d) and 15(a)-15(d) and replace the original sheets with Figs. 14(a)-14(d) and 15(a)-15(d).

Attachment: Replacement Sheets